

NASA-TM-109854

NASA HQ
IN-09-TM
10268
P-49

National Facilities Study

(NASA-TM-109854) NATIONAL
FACILITIES STUDY. VOLUME 1:
FACILITIES INVENTORY (NASA) 49 p

N94-34632

Unclass

G3/09 0015268

Facilities Inventory

Volume 1

April 29, 1994

NASA
Washington, D. C.



Volume 1 – Facilities Inventory

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SUMMARY

It was clear early in the effort that an inventory of existing aerospace facilities had to be developed to perform the study. The scope had to include Aeronautics R&D, Space R&D, and Space Operations facilities. Significant facilities in both Government and private industry needed to be identified and categorized.

The Facilities/Engineering and Costing Task Group and the other Task Groups jointly developed a three-page format for the inventory. It includes a brief description of the facility, key operating parameters capabilities, cost data, degree of utilization, and point of contact for additional information.

Data was solicited from all NASA centers, DoE, NOAA, and from the Army, Navy, Air Force, Advanced Projects Research Agency, and the Ballistic Missile Defense Organization. Industry participation was assisted by the Aerospace Industries Association and the American Institute of Aeronautics and Astronautics, leading to direct interaction with the key companies. Each site (private industry or government) was provided a standardized data input package to report the characteristics of its facilities.

Guidelines were issued to limit the data inputs to the more significant key facilities. This still resulted in more facilities than could be evaluated in the time available and approaches were developed by the task groups to focus on the areas most likely to pay off.

The information returned from the responding sites was merged into a single comprehensive inventory, resident in a computer database for ease of access to the information. The database provided a number of analytical tools and capabilities to assist the task groups in performing their study efforts.

Data loading was, and still is, a dynamic process. Data was received at various times throughout the course of the study, and the database was appended as each new data set was received.

The NFS facility inventory is now the most comprehensive source of information concerning aeronautics and aerospace facilities available. The inventory contains detailed information on 2,823 facilities from 78 sites. This represents nearly 8,000 pages of information. The following table summarizes the number of facilities contained in the database to date by agency and industry:

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	<u># Sites</u>	<u># Facilities</u>
NASA	11	1,044
DoD	30	694
NOAA	3	51
DoE	10	130
Industry	<u>24</u>	<u>904</u>
Total	78	2,823

PURPOSE

The inventory activity was initiated to solve the critical need for a single source of site specific descriptive and parametric data on major public and privately held aeronautics and aerospace related facilities. This was a challenging undertaking due to the scope of the effort and the short lead time in which to assemble the inventory and have it available to support the task group study needs. The inventory remains dynamic as sites are being added and the data is accessed and refined as the study progresses.

The inventory activity also included the design and implementation of a computer database and analytical tools to simplify access to the data.

This volume describes the steps which were taken to define the data requirements, select sites, solicit and acquire data from them. A discussion of the inventory structure and analytical tools is also provided.

DATA DEFINITION

The Facility Engineering and Costing Task Group in cooperation with the other Task Groups defined a standard set of data that would be applicable for Space Research and Development, Space Operations, and Aeronautics Research and Development facilities. The data format was carefully constructed to allow NASA, DoD, and private industry facilities to be accurately described. The input from the task groups was critical since they had the technical knowledge of what were the important features of a facility that must be available to support their analysis. The resultant data and parametric analysis requirements are reflected in the inventory structure.

ACTIVITY SELECTION

The task groups, with the assistance of the Facilities Engineering and Costing task group developed a preliminary listing of locations to be included in the inventory. This was done to a great extent based on personal knowledge and experience. The task

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groups also identified the federal agencies which were considered major participants in aeronautics and aerospace activities.

The industry sites were primarily member firms of the Aerospace Industries Association (AIA), or the American Institute of Aeronautics and Astronautics (AIAA). The AIA and AIAA were informed of the NFS and assisted the team in contacting and soliciting inputs from their member companies. Industry participation was voluntary. Figure I - 1 lists the type of facilities that were targeted for inclusion in the inventory.

DATA ACQUISITION

A questionnaire was sent to each of the selected sites. Samples of three completed questionnaires are shown in shown in Figures I - 2, I - 3, and I - 4, and provide details on the following buildings:

Figure I - 2 The Vertical Processing Facility at the Kennedy Space Center

Figure I - 3 J-6 Rocket Propulsion Test Facility at Arnold Engineering Center

Figure I - 4 National Transonic Facility at Langley Research Center

Due to the volume of information to be collected an electronic media was developed to simplify the data acquisition process and to minimize data entry errors. The electronic input form was structured to have "picklists" for the majority of the data elements. These picklists afforded users the opportunity to quickly choose from a range of predefined responses to most data fields. This greatly reduced the time required to fill out the questionnaire and was designed to provide a level of data consistency. The person filling out the questionnaire could enter a different response if the predefined selections were not sufficient. The result of allowing the user to add data is reflected in the growth in facility categories, programs and keywords discussed previously. The electronic input form provided the additional advantage of allowing the site specific input data to be electronically loaded into the NFS database, as opposed to having to manually transfer the data.

When site data was received a number of validation and verification activities took place. This was designed to insure that all data available to the task groups was accurate and consistent.

When necessary, error reports were returned to the respondents for clarification of information. If the concerns or questions were minor in scope the respondents were contacted by telephone and data ambiguities resolved.

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No attempt was made to force the use of the predefined data categories, or to judge the accuracy of the parametric data. This would be the responsibility of the task groups if they felt it necessary to their analysis efforts.

INVENTORY STRUCTURE

The inventory data was structured to be hierarchial as shown in this simplified outline:

- A. Owner
- B. Location
- C. Building
- D. Building parameters
 - D1. size
 - D2. Operations & maintenance cost
- E. Facility Type
 - E1. Program Supported
 - E2. Keyword
- F. Performance parameter

This approach allowed individual sites to have one or more buildings, as well as individual buildings to contain one or more facilities. This was done to allow the inventory to be very specific and not be limited to only listing what might be considered the primary function of any particular building or structure. Figures I - 5 and I - 6 provide examples of programs supported and keywords as were developed by the specific sites.

DATA ANALYSIS TOOLS

The database into which the site specific inventory data was loaded was selected to provide easy access to the data, with analytical tools to perform manipulations of the data to support the task group analysis requirements. Analytical tools included sophisticated query and edit capabilities and custom report generators.

Analysis can be performed at any level of the hierarchy structure previously defined (see "Inventory Structure" on pg. I - 2). For example, a query can be constructed to select only those facilities which match a particular keyword. Similarly, a higher level query can be constructed to select only those buildings of a selected size.

INVENTORY RESULTS

A comprehensive inventory, describing an estimated 80 to 85 percent of the aeronautics and aerospace facilities throughout the nation was compiled. This

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inventory was available to support the NFS analytical requirements. Over 2800 facilities at 78 different sites are included. The following table summarizes the facilities contained in the inventory.

	<u># Sites</u>	<u># Facilities</u>
NASA	11	1,044
DoD	30	694
NOAA	3	51
DoE	10	130
Industry	<u>24</u>	<u>904</u>
Total	78	2,823

Figure I - 7 contains a listing of the sites included in the inventory by agency/industry. Figure I - 8 identifies the type facilities at each of these sites that were available for analytical review.

Over 1230 supported programs are identified, and facilities are categorized by one or more of over 1500 keywords. In total over 8000 pages of detailed narrative and parametric data is included in the inventory and used by the NFS Task Groups.

CONCLUSION

The NFS Facilities Inventory affords us analysis opportunities which clearly offer potential cost savings and technological benefits. The facilities inventory provides a comprehensive and accessible source of information on major government and industry facilities. The inventory is a building block on which both industry and government can develop their long term technology and facilities investment strategies.

To permit the inventory to be of the greatest future benefit, it should be expanded to include a greater percentage of the total nationwide facilities. Data definitions should be refined, validation and data verification procedures strengthened, and user access improved.

RECOMMENDATIONS FOR FUTURE ACTIVITIES

The Inventory of United States aeronautics and aerospace facilities should be completed by adding additional site data required to contain all major, U. S. facilities,

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refined to enhance analytical capabilities, and maintained to ensure data is current and accurate. In order to permit the long term utility of the inventory the following should be considered:

A process for ensuring the inventory is up-to-date and accurate should be developed and implemented.

As the number of users and represented sites increase a strategy to protect sensitive or proprietary data, control data access, and monitor system usage should be developed.

The sites and data currently contained in the inventory should be reviewed to determine additional sites/facilities to be included, as well as facilities currently included which may be superfluous. Criteria for determining facilities to be included in the inventory should be developed to permit orderly future growth.

A comprehensive review of the existing data should be performed, and a more concise data set should be established in order to provide greater data discipline, and enhance analysis capabilities.

Inventory customers should be determined, and a strategy developed to make the data available to them at the lowest life cycle cost.

Volume 1 - Facilities Inventory

Assembly
Command Destruct
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support(E.G. Clean Room)
Human Factors/Biomedical
Landing Ops
Launch
Launch Processing Ops
Launch Processing/Booster
Launch Processing/Ordnance
Manufacturing
Materials
Mission Operations
On-Orbit Mission Control Centers
Operational Simulation/Demonstration
Operations
Payload Operations
Processing
Propulsion Testing
Range
Recovery Ops
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Training
Wind Tunnels

Figure I - 1
Types of Facilities in the NFS Inventory

National Facilities Study
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C.1 KENNEDY SPACE CENTER	1
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F.1 High Bay 1 Cell	3
F.2 High Bay 2 Cell	4
F.3 High Bay 3 Cell	5
F.4 High Bay 4 Cell	6
F.5 High Bay Towers (6)	7
F.6 High Bay Transfer Aisle	8
F.7 LB Cells (8) Low Bay Area/East	9
F.8 LB Cells (8) Low Bay Area/West	10
F.9 Low Bay Transfer Aisle	11
F.10 Utility Annex/K6-947	12

Figure I - 2
Sample Completed Questionnaire - KSC VAB

National Facilities Study
Center/Base Data

Page 1

1. Agency : National Aeronautics and Space Administration

Center/Base : KENNEDY SPACE CENTER

Address : CODE DF

JOHN F. KENNEDY SPACE CENTER

KENNEDY SPACE CENTER, FL US 32899

2. Contact Name : DON PAGE

Organization : ENGINEERING DEVELOPMENT

Phone Number : 407-867-4553

Fax Number : 407-867-4812

Mail Stop : DF

3. Date Submitted : Jul 14, 1993

Updated : Dec 14, 1993

Date Printed : Jan 27, 1994

National Facilities Study
Building Data

Page 2

1. Building Name : Vehicle Assembly Building /K6-0848
Center/Base Name : KENNEDY SPACE CENTER

Updated Nov 05, 199
Date Printed : Jan 27, 199

2. Geographical Location

City : Kennedy Space Center
State : FL
Country : UNITED STATES
ZipCode : 32899

3. Owner (If Privately Owned) : N/A

4. Occupancy Year : 1966

5. Status :

- ☐ Under Construction
☒ Active
☐ Inactive

6. Condition :

- ☐ New
☒ Good
☐ Fair
☐ Poor

7. Building Description :

The launch Vehicle Assembly Building (VAB) is capable of supporting the receiving, assembly, integration, test and checkout of the Space Shuttle elements. It is an integral part of the LC-39 integrate, transport and launch (ITL) concept for Shuttle processing and launch. The VAB also provides external tank and orbiter main engine storage, test and checkout capabilities. Each VAB integration cell is capable of supporting 7 Shuttle launches per year. The VAB covers an area of about 8 acres and has a volume of 129,482,000 cubic feet. It is 525 feet tall, 715 feet long and 518 feet wide. The structures can withstand winds up to 125 miles per hour. The foundation rests on more than 4200 steel pipe pilings, each 16 inches in diameter and driven down to bedrock at a depth of 160 feet. The Low Bay is 210 feet tall and contains the Shuttle main engine maintenance shop and serves as a holding area for SRB forward assemblies and aft skirts. Facing east are High Bays 1 and 3 where SRB stacking, ET/SRB Mate and Orbiter/ET Mate occurs in a vertical position on the Mobile Launcher Platform. Facing west is High Bays 2 and 4 where ET Checkout and storage takes place. Each open VAB high bay is situated between an office tower. There are three towers on the east side and three towers on the west side. Since the VAB is a hazardous facility due to the presence of solid rocket motor segments, these office towers are unoccupied. The VAB has more than 70 lifting devices including two 250-ton bridge cranes. Two new 325-ton bridge cranes are in the process of being installed to replace the 250-ton cranes. The Low Bay has a 175-ton bridge crane that traverses the length of the transfer aisle thru the Low Bay and High Bay. NOTE: Each High Bay door is 465 sq. ft. from ground to top. The lower door is 192 ft. wide and 114 ft. high; the upper door is 342 ft. high, 76 ft. wide. The north VAB door is 55 x 55 and the south VAB door is 55 x 95. Located immediately west of the VAB is the 29,000 sq. ft. Utility Annex/K6-947 which provides utility support to the VAB.

8. Square Feet of Building : 1702551

9. Availability for Non-Owner Utilization : ☐ Yes ☒ No

If Yes, Sector : ☐ Military

☐ I - 10
CIVIL GOV't

☐ Commercial

National Facilities Study
Building Data

Page 2a

1. Building Name : Vehicle Assembly Building /K6-0848
Center/Base Name : KENNEDY SPACE CENTER

Updated Nov 05, 1993
Date Printed : Jan 27, 1994

10. Current Replacement Value
Building (Brick & Mortar)

- ☐ \$0M - \$1M
- ☐ \$1M - \$5M
- ☐ \$5M - \$10M
- ☐ \$10M - \$50M
- ☐ \$50M - \$100M
- ☒ \$100M+

11. Current Replacement
Value Outfitting

- ☐ \$0M - \$50M
- ☐ \$50M - \$100M
- ☐ \$100M - \$200M
- ☐ \$200M - \$350M
- ☐ \$350M - \$500M
- ☒ \$500M+

12. Current Annual
Ops & Maintenance

- ☐ \$0K - \$25K
- ☐ \$25K - \$100K
- ☐ \$100K - \$200K
- ☐ \$200K - \$350K
- ☐ \$350K - \$500K
- ☒ \$500K+

13. Support Category (See attachment for selections) :

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____

National Facilities Study Facility Data

Page 3

1. Facility Name : High Bay 1 Cell
 Building Name : Vehicle Assembly Building /K6-0848
 Updated Nov 05, 1997
 Date Printed : Jan 27, 1998

2. Percent Utilized 80
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☒ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Manufacturing</u>	_____
c. <u>WG Payload Processing, Launch & Recovery</u>	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>250.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>crane #2 capacity</u>	<u>tons</u>	<u>325.0</u>	<u>D</u>
> <u>crane #2 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>door #1 height</u>	<u>feet</u>	<u>342.0</u>	<u>D</u>
> <u>door #1 width</u>	<u>feet</u>	<u>76.0</u>	<u>D</u>
> <u>door #2 height</u>	<u>feet</u>	<u>114.0</u>	<u>D</u>
> <u>door #2 width</u>	<u>feet</u>	<u>192.0</u>	<u>D</u>
> <u>facility height</u>	<u>feet</u>	<u>475.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>200.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>150.0</u>	<u>D</u>

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported	
			Start	End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975</u>	<u>9999</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

National Facilities Study Facility Data

Page 4

1. Facility Name : High Bay 2 Cell Updated Nov 05, 1993
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 40
 Basis(Shifts/Days): ☒ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>250.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>crane #2 capacity</u>	<u>tons</u>	<u>325.0</u>	<u>D</u>
> <u>crane #2 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>door #1 height</u>	<u>feet</u>	<u>342.0</u>	<u>D</u>
> <u>door #1 width</u>	<u>feet</u>	<u>76.0</u>	<u>D</u>
> <u>door #2 height</u>	<u>feet</u>	<u>114.0</u>	<u>D</u>
> <u>door #2 width</u>	<u>feet</u>	<u>192.0</u>	<u>D</u>
> <u>facility height</u>	<u>feet</u>	<u>475.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>200.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>150.0</u>	<u>D</u>

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start	End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975</u>	<u>9999</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

National Facilities Study Facility Data

Page 5

1. Facility Name : High Bay 3 Cell
 Building Name : Vehicle Assembly Building /K6-0848
 Updated Nov 05, 1994
 Date Printed : Jan 27, 1994

2. Percent Utilized 80
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☒ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>250.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>crane #2 capacity</u>	<u>tons</u>	<u>325.0</u>	<u>D</u>
> <u>crane #2 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>door #1 height</u>	<u>feet</u>	<u>342.0</u>	<u>D</u>
> <u>door #1 width</u>	<u>feet</u>	<u>76.0</u>	<u>D</u>
> <u>door #2 height</u>	<u>feet</u>	<u>114.0</u>	<u>D</u>
> <u>door #2 width</u>	<u>feet</u>	<u>192.0</u>	<u>D</u>
> <u>facility height</u>	<u>feet</u>	<u>475.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>200.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>150.0</u>	<u>D</u>

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start	End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975</u>	<u>9999</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

National Facilities Study Facility Data

Page 6

1. Facility Name : High Bay 4 Cell Updated Nov 05, 1993
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 40
 Basis(Shifts/Days): ☒ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>250.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>crane #2 capacity</u>	<u>tons</u>	<u>325.0</u>	<u>D</u>
> <u>crane #2 hook height</u>	<u>feet</u>	<u>462.0</u>	<u>D</u>
> <u>door #1 height</u>	<u>feet</u>	<u>342.0</u>	<u>D</u>
> <u>door #1 width</u>	<u>feet</u>	<u>76.0</u>	<u>D</u>
> <u>door #2 height</u>	<u>feet</u>	<u>114.0</u>	<u>D</u>
> <u>door #2 width</u>	<u>feet</u>	<u>192.0</u>	<u>D</u>
> <u>facility height</u>	<u>feet</u>	<u>475.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>200.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>150.0</u>	<u>D</u>

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975 9999</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

National Facilities Study Facility Data

Page 7

1. Facility Name : High Bay Towers (6) Updated Nov 05, 199
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 10
 Basis(Shifts/Days): ☒ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>facility height</u>	<u>feet</u>	<u>525.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>200.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>35.0</u>	<u>D</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. <u>Administrative</u>	<u>12983</u>
b. <u>Logistics</u>	<u>208175</u>
c. <u>Maintenance</u>	<u>20484</u>
d. <u>Precision Measurement Equipment Lab</u>	<u>155618</u>
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start End
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

National Facilities Study Facility Data

Page 8

1. Facility Name : High Bay Transfer Aisle Updated Nov 05, 1993
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 50
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☒ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>175.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>165.0</u>	<u>D</u>
> <u>door #1 height</u>	<u>feet</u>	<u>53.0</u>	<u>D</u>
> <u>door #1 width</u>	<u>feet</u>	<u>56.0</u>	<u>D</u>
> <u>facility height</u>	<u>feet</u>	<u>475.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>418.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>94.0</u>	<u>D</u>
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975 9999</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

National Facilities Study Facility Data

Page 9

1. Facility Name : LB Cells (8) Low Bay Area/East Updated Nov 05, 1995
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 60
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☒ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>175.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>166.0</u>	<u>D</u>
> <u>facility height (each)</u>	<u>feet</u>	<u>210.0</u>	<u>D</u>
> <u>facility length (each)</u>	<u>feet</u>	<u>260.0</u>	<u>D</u>
> <u>facility width (each)</u>	<u>feet</u>	<u>190.0</u>	<u>D</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. <u>Administrative</u>	<u>58426</u>
b. <u>Logistics</u>	<u>69392</u>
c. <u>Maintenance</u>	<u>6828</u>
d. <u>Precision Measurement Equipment Lab</u>	<u>51873</u>
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975 1999</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

National Facilities Study Facility Data

Page 10

1. Facility Name : LB Cells (8) Low Bay Area/West Updated Nov 05, 1993
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 60
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☒ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>175.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>166.0</u>	<u>D</u>
> <u>facility height</u>	<u>feet</u>	<u>210.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>260.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>190.0</u>	<u>D</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. <u>Administrative</u>	<u>58426</u>
b. <u>Logistics</u>	<u>69392</u>
c. <u>Maintenance</u>	<u>6828</u>
d. <u>Precision Measurement Equipment Lab</u>	<u>51873</u>
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975 9999</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

National Facilities Study Facility Data

Page 11

1. Facility Name : Low Bay Transfer Aisle Updated Nov 05, 199
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 60
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☒ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch control/processing/integration</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>crane #1 capacity</u>	<u>tons</u>	<u>175.0</u>	<u>D</u>
> <u>crane #1 hook height</u>	<u>feet</u>	<u>166.0</u>	<u>D</u>
> <u>door #1 height</u>	<u>feet</u>	<u>94.0</u>	<u>D</u>
> <u>door #1 width</u>	<u>feet</u>	<u>55.0</u>	<u>D</u>
> <u>facility height</u>	<u>feet</u>	<u>75.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>260.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>92.0</u>	<u>D</u>
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start	End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975</u>	<u>1993</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

National Facilities Study Facility Data

Page 12

1. Facility Name : Utility Annex/K6-947 Updated Nov 05, 1993
 Building Name : Vehicle Assembly Building /K6-0848 Date Printed : Jan 27, 1994

2. Percent Utilized 100
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☒ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☒ Unclassified ☐ Confidential ☐ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Launch</u>	<u>launch pad/structures/support</u>
b. <u>WG Payload Processing, Launch & Recovery</u>	_____
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>facility height</u>	<u>feet</u>	<u>20.0</u>	<u>D</u>
> <u>facility length</u>	<u>feet</u>	<u>250.0</u>	<u>D</u>
> <u>facility width</u>	<u>feet</u>	<u>100.0</u>	<u>D</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start End
<u>Space Shuttle</u>	<u>PRESENT</u>	<u>NASA</u>	<u>1975 9999</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

National Facilities Study
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Figure I - 3
Sample Completed Questionnaire - AEDC J6

National Facilities Study
Center/Base Data

Page 1

1. Agency : Department of Defense

Center/Base : ARNOLD ENGINEERING DEVELOPMENT CENTER

Address : _____

US

2. Contact Name : John Rumpy

Organization : Deputy for Operations (DO)

Phone Number : 615-454-7621

Fax Number : 615-454-3559

Mail Stop : 9010

3. Date Submitted : Jul 23, 1993

Updated : Dec 14, 1993

Date Printed : Jan 27, 1994

National Facilities Study
Building Data

Page 2

1. Building Name : J-6 Rocket Propulsion Test Facility Bldg. 2124.
Center/Base Name : ARNOLD ENGINEERING DEVELOPMENT CENTER

Updated Nov 16, 1995
Date Printed : Jan 27, 1996

2. Geographical Location

City : Tullahoma
State : TN
Country : UNITED STATES
ZipCode : 37389 - 9010

3. Owner (If Privately Owned) : N/A

4. Occupancy Year : 1994

5. Status :

- ☒ Under Construction
☐ Active
☐ Inactive

6. Condition :

- ☒ New
☐ Good
☐ Fair
☐ Poor

7. Building Description :

J-6 is a remotely located facility built for testing of detonable solid-propellant rocket motors with up to 80,000 lbs of propellant without introducing risk to other AEDC facilities. J-6 is a horizontally arranged test cell designed for static testing of large solid-propellant rocket motors with up to 500,000 lb thrust at simulated pressure altitudes of 100,000 ft. An annular steam ejector with flow rates up to 3,000 lb/sec and a water-cooled diffuser system are used in conjunction with a 4.5 million-cu ft. dehumidification chamber to provide pre- and post-test altitude simulation and to minimize recirculation during motor tailoff. Test objectives that can be accomplished in Test Cell J-6 are rocket performance, altitude ignition, development of high ratios nozzles, and spin testing.

8. Square Feet of Building : 16000

9. Availability for Non-Owner Utilization : ☒ Yes ☐ No

If Yes, Sector : ☒ Military ☒ Civil Gov't ☒ Commercial

10. Current Replacement Value
Building (Brick & Mortar)

- ☐ \$0M - \$1M
☐ \$1M - \$5M
☐ \$5M - \$10M
☐ \$10M - \$50M
☐ \$50M - \$100M
☒ \$100M+

11. Current Replacement
Value Outfitting

- ☐ \$0M - \$50M
☒ \$50M - \$100M
☐ \$100M - \$200M
☐ \$200M - \$350M
☐ \$350M - \$500M
☐ \$500M+

12. Current Annual
Ops & Maintenance

- ☒ \$0K - \$25K
☐ \$25K - \$100K
☐ \$100K - \$200K
☐ \$200K - \$350K
☐ \$350K - \$500K
☐ \$500K+

13. Support Category (See attachment for selections) :

- a. Administrative
b. Logistics
c. Precision Measurement Equipment Lab
d. Safety

National Facilities Study
Building Data

Page 2a

I. Building Name : J-6 Rocket Propulsion Test Facility Bldg. 2124.

Center/Base Name : ARNOLD ENGINEERING DEVELOPMENT CENTER

Updated Nov 16, 1993

Date Printed : Jan 27, 1994

13. Support Category (See attachment for selections) :

e. Security

f. _____

National Facilities Study Facility Data

Page 3

1. Facility Name : J-6 Rocket Propulsion Test Facility Updated Nov 16, 1995
 Building Name : J-6 Rocket Propulsion Test Facility Bldg. 2124. Date Printed : Jan 27, 1996

2. Percent Utilized
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☒ Other: Under Construction

3. Security Level : ☐ Unclassified ☐ Confidential ☐ Secret ☒ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Propulsion Testing</u>	<u>data reduction and data acquisition</u> <u>integrated test</u> <u>simulated altitude test facility</u>
b. <u>Rocket Propulsion Ground Test Facility</u>	<u>data reduction and data acquisition</u> <u>integrated test</u> <u>simulated altitude test facility</u> <u>spin test</u>
c. <u>WG Power & Propulsion</u>	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>access door length</u>	<u>feet</u>	<u>20.0</u>	<u>D</u>
<u>access door width</u>	<u>feet</u>	<u>40.0</u>	<u>D</u>
> <u>air temperature</u>	<u>degrees-fahrenheit</u>	<u>15.0 - 110.0</u>	<u>R</u>
> <u>axial force</u>	<u>pounds-force</u>	<u>500000.0</u>	<u>D</u>
> <u>crane capacity 1</u>	<u>tons</u>	<u>75.0</u>	<u>X</u>
> <u>dehumidification access</u>	<u>square feet</u>	<u>10.0</u>	<u>D</u>
> <u>dehumidification chamber diameter</u>	<u>feet</u>	<u>250.0</u>	<u>D</u>
> <u>dehumidification chamber height</u>	<u>feet</u>	<u>100.0</u>	<u>D</u>
> <u>pitch force</u>	<u>pounds-force</u>	<u>300000.0</u>	<u>D</u>
> <u>spin rate</u>	<u>revolutions/minute</u>	<u>0.0 - 250.0</u>	<u>R</u>
<u>test section diameter</u>	<u>feet</u>	<u>26.0</u>	<u>D</u>
> <u>test section length</u>	<u>feet</u>	<u>62.0</u>	<u>X</u>
> <u>yaw force</u>	<u>pounds-force</u>	<u>150000.0</u>	<u>D</u>

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. <u>Administrative</u>	<u>0</u>
b. <u>Logistics</u>	<u>0</u>
c. <u>Safety</u>	<u>0</u>
d. <u>Security</u>	<u>0</u>
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start	End
<u>Castor 120</u>	<u>FUTURE</u>	_____	<u>1994</u>	<u>1994</u>

National Facilities Study Facility Data

Page 3a

1. Facility Name : J-6 Rocket Propulsion Test Facility
 Building Name : J-6 Rocket Propulsion Test Facility Bldg. 2124.

Updated Nov 16, 1993
 Date Printed : Jan 27, 1994

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start	End
<u>Castor IV-XL</u>	<u>FUTURE</u>		<u>1994</u>	<u>1994</u>
<u>PK Program - Stages II and III</u>	<u>FUTURE</u>	<u>Air Force</u>	<u>1994</u>	<u>1999</u>

National Facilities Study Facility Data

Page 4

1. Facility Name : Propulsion Development Test Cell T-6 Updated Nov 16, 199
 Building Name : J-6 Rocket Propulsion Test Facility Bldg. 2124. Date Printed : Jan 27, 199

2. Percent Utilized
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☒ Other: as required

3. Security Level : ☐ Unclassified ☐ Confidential ☐ Secret ☒ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Propulsion Testing</u>	<u>exhaust plume spectral characteristics</u>
b. <u>Rocket Propulsion Ground Test Facility</u>	<u>simulated altitude test facility</u>
c. <u>WG Power & Propulsion</u>	<u>simulated altitude test facility</u>
d. _____	<u>simulated flight environments</u>

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>simulated flight environment @ mach 3.</u>	<u>feet</u>	<u>90000.0</u>	<u>D</u>
> <u>test cell diameter</u>	<u>feet</u>	<u>3.0</u>	<u>D</u>
> <u>test cell length</u>	<u>feet</u>	<u>18.0</u>	<u>D</u>
> <u>wavelength range</u>	<u>micrometers</u>	<u>0.25 - 5.0</u>	<u>R</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported Start End
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

National Facilities Study Facility Data

Page 5

1. Facility Name : Ultra-High Altitude Research Test Cell R2H Updated Nov 16, 1993
 Building Name : J-6 Rocket Propulsion Test Facility Bldg. 2124. Date Printed : Jan 27, 1994

2. Percent Utilized 30
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☐ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☒ Other: as required

3. Security Level : ☐ Unclassified ☐ Confidential ☐ Secret ☒ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>Propulsion Testing</u>	<u>high-altitude simulator</u> <u>liquid rocket engine test stands</u> <u>propulsion test</u>
b. <u>Research Laboratory</u>	<u>high area ratio nozzle flow field diagnostics</u> <u>high-altitude simulator</u> <u>propulsion test</u>
c. <u>Test Chambers</u>	<u>high-altitude simulator</u> <u>liquid rocket engine test stands</u>
d. <u>WG Power & Propulsion</u>	_____
e. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type*
> <u>mass flow = 30 grams/sec</u>	<u>feet</u>	<u>200000.0</u>	<u>D</u>
> <u>mass flow = 5 grams/sec</u>	<u>feet</u>	<u>225000.0</u>	<u>D</u>
> <u>test chamber diameter</u>	<u>feet</u>	<u>3.0</u>	<u>D</u>
<u>test chamber length</u>	<u>feet</u>	<u>5.0</u>	<u>D</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported	
			Start	End
<u>UV Mechanism Research Program</u>	<u>PRESENT</u>	<u>Air Force</u>	<u>1991</u>	<u>1994</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

National Facilities Study
TABLE OF CONTENTS

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C.1 LANGLEY RESEARCH CENTER	1
B.1 National Transonic Facility/1236	2
F.1 National Transonic Facility	3

Figure I - 4
Sample Completed Questionnaire - LaRC NTF

National Facilities Study
Center/Base Data

Page 1

1. Agency : National Aeronautics and Space Administration

Center/Base : LANGLEY RESEARCH CENTER

Address : CODE 446

LANGLEY RESEARCH CENTER

HAMPTON, VA US 23655 - 5225

2. Contact Name : ALAN FARROW

Organization : FACILITIES PROGRAM DEVELOPMENT OFFICE

Phone Number : 446

Fax Number : 48096

Mail Stop : 446

3. Date Submitted : Jul 16, 1993

Updated : Dec 16, 1993

Date Printed : Jan 27, 1994

National Facilities Study
Building Data

Page 2

1. Building Name : National Transonic Facility/1236
Center/Base Name : LANGLEY RESEARCH CENTER

Updated Nov 05, 1995
Date Printed : Jan 27, 1994

2. Geographical Location

City : HAMPTON
State : VA
Country : UNITED STATES
ZipCode : 23681

3. Owner (If Privately Owned) : US GOVERNMENT

4. Occupancy Year : 1982

5. Status :

- ☐ Under Construction
☒ Active
☐ Inactive

6. Condition :

- ☐ New
☒ Good
☐ Fair
☐ Poor

7. Building Description :

The National Transonic Facility is used to perform high-Reynolds number aerodynamic and fluid dynamic experimental research on a wide range of flight and aerospace vehicles at Mach number of 0.2 to 1.2 and Reynolds number per foot up to 120x10 to the 6 power. The facility is a continuous flow, closed circuit, pressurized, test medium. Full-scale flight Reynolds number test conditions are achieved when the facility operates with the gaseous nitrogen test medium. As a result of this unique capability, the facility is rated as "World Class." A \$60 million facility upgrade for productivity improvement is scheduled for fiscal year 1994.

8. Square Feet of Building : 40616

9. Availability for Non-Owner Utilization : ☒ Yes ☐ No

If Yes, Sector : ☒ Military ☒ Civil Gov't ☒ Commercial

10. Current Replacement Value

Building (Brick & Mortar)

- ☐ \$0M - \$1M
☐ \$1M - \$5M
☐ \$5M - \$10M
☐ \$10M - \$50M
☐ \$50M - \$100M
☒ \$100M+

11. Current Replacement

Value Outfitting

- ☐ \$0M - \$50M
☐ \$50M - \$100M
☐ \$100M - \$200M
☐ \$200M - \$350M
☒ \$350M - \$500M
☐ \$500M+

12. Current Annual

Ops & Maintenance

- ☐ \$0K - \$25K
☐ \$25K - \$100K
☐ \$100K - \$200K
☐ \$200K - \$350K
☐ \$350K - \$500K
☒ \$500K+

13. Support Category (See attachment for selections) :

- a. Administrative
b. Maintenance
c. Power
d. Precision Measurement Equipment Lab
e. Safety

National Facilities Study
Building Data

Page 2a

1. Building Name : National Transonic Facility/1236

Center/Base Name : LANGLEY RESEARCH CENTER

Updated Nov 05, 1993

Date Printed : Jan 27, 1994

13. Support Category (See attachment for selections) :

f. Transportation

National Facilities Study Facility Data

Page 3

1. Facility Name : National Transonic Facility Updated Dec 10, 199
 Building Name : National Transonic Facility/1236 Date Printed : Jan 27, 199

2. Percent Utilized 67
 Basis(Shifts/Days): ☐ 1 Shift/5 Days ☐ 1 Shifts / 7 Days ☒ 2 Shifts / 5 Days ☐ 2 Shifts / 7 Days
☐ 3 Shifts / 5 Days ☐ 3 Shifts / 7 Days ☐ Other: _____

3. Security Level : ☐ Unclassified ☐ Confidential ☒ Secret ☐ Top Secret
☐ Other: _____

4. Facility Types (see attachment for selections) :

Type	Keywords
a. <u>WG Aero & Acoustics</u>	_____
b. <u>Wind Tunnels</u>	<u>aero/aerothermo-dynamics</u> <u>cryogenic test</u> <u>data reduction and data acquisition</u> <u>wind tunnel/transonic</u>
c. _____	_____
d. _____	_____

5. Performance Parameters (see attachment for selections) :

Parameter Name	Unit of Measure	Value(s)	Type
> <u>angle-of-attack</u>	<u>degrees</u>	<u>-11.0 - 45.0</u>	<u>R</u>
> <u>angle-of-yaw</u>	<u>degrees</u>	<u>-180.0 - 180.0</u>	<u>R</u>
<u>mach #</u>	<u>unitless</u>	<u>0.2 - 1.2</u>	<u>R</u>
> <u>pressure capability</u>	<u>psia</u>	<u>14.7 - 133.7</u>	<u>R</u>
<u>reynolds #</u>	<u>millions per foot</u>	<u>120.0</u>	<u>X</u>
> <u>roll angle</u>	<u>degrees</u>	<u>-15.0 - 15.0</u>	<u>R</u>
<u>temperature range - fahrenheit</u>	<u>degrees</u>	<u>-320.0 - 150.0</u>	<u>R</u>
<u>test section height</u>	<u>feet</u>	<u>8.2</u>	<u>D</u>
<u>test section length</u>	<u>feet</u>	<u>25.0</u>	<u>D</u>
<u>test section width</u>	<u>feet</u>	<u>8.2</u>	<u>D</u>

Types : D - Discrete Value R - Range M - Minimum Value X - Maximum Value B - Yes/No

6. Support Category (see attachment for selections) :

Support Category	Square Feet
a. <u>Precision Measurement Equipment Lab</u>	<u>0</u>
b. <u>Transportation</u>	<u>40616</u>
c. _____	_____
d. _____	_____
e. _____	_____

7. Programs (see attachment for selections) :

Programs Supported	(Past/Present/Future) Status	Customer	Years Supported	
			Start	End
<u>Advanced Subsonic Transportation</u>	<u>PRESENT</u>	<u>Boeing, McDo</u>	<u>1993</u>	<u>2000</u>
<u>Boeing 767</u>	<u>PRESENT</u>	<u>BOEING</u>	<u>1990</u>	<u>1996</u>
<u>C-17</u>	<u>PRESENT</u>	<u>Douglas Airc</u>	<u>1989</u>	<u>1995</u>
<u>High Speed Research</u>	<u>PRESENT</u>	<u>Boeing, McDo</u>	<u>1993</u>	<u>2000</u>

Volume 1 - Facilities Inventory

Access to Space
Advanced Solid Rocket Motor
Air Force Ballistic Missile Launches
Assured Crew Return Vehicle (ACRV)
Atlas/Centaur
AXAF
Clementine
Comet
Commercial Titan III
Crystal Growth Furnace
Defense Meteorological Satellite Program
Defense Satellite Communications System
Dod Satellites
Earth Observing System
FEWS Program
Galileo
Gamma Ray Observatory
High Speed Research
Hybrid Booster Development
LOX/Hydrocarbon Engine
Mars Return Vehicles
MICOM (Next Generation Missile)
Mission to Planet Earth
NASP
New Generation Launch Vehicle
P&W RL-10 Upgrade
Pegasus
Pluto Fly By
Propulsion Technology
Robotic Technology Test Vehicle
SCRAMJET Test Facility
Solid Propellant R/D
Solidification Furnace
Space Based Laser
Space Shuttle
Space Shuttle Solid Rocket Motor
STME
TDRSS
Telerobotics
Transport Aircraft

Figure I - 5
Examples of Programs Supported

Volume 1 - Facilities Inventory

Figure I - 6
Examples of Keywords Used in NFS Inventory

aerodynamics research	thermal-vacuum solar simulation
aeropropulsion heat transfer research	thermal-vacuum test chamber
aircraft propulsion test	tribology
altitude chambers	vacuum chambers/thermal
anechoic test chamber	vtol hover test stand
antenna test range	wind tunnel/hypersonic
arc jet	wind tunnel/subsonic
balloon/sounding rocket tracking data	wind tunnel/supersonic
acquisition	wind tunnel/transonic
communications control center	
drop tower	
engine test stand	
hybrid propulsion test facility	
launch control, processing, and integration	
launch facilities, structures, and support	
liquid rocket engine test stands	
low-speed aerodynamic research	
neutral buoyancy	
payload operations and control centers	
propellant tank - mfg	
propulsion component test	
pyrotechnics test	
radio frequency anechoic test chamber	
rocket propulsion test	
simulator testing	
simulators	
solar array simulators	
solid motor build-up	
solid rocket motor test stands	
space vehicle assembly	
spacecraft control centers	
spacecraft test	
spin and attitude control systems test	
spin test	
srm manufacturing	
tanks and assembly manufacturing	
temperature & altitude control chambers	
test/acoustic model	
test/anechoic	
test cell - rocket propulsion test	
test cell - subscale engine components	
test/structural - thermal	

Volume 1 - Facilities Inventory

Agency:

Site

DoD

Antigua AS, West Indies
Armstrong Laboratory/Human System Center
Arnold Engineering Development Center
Ascension AAF, South Atlantic
BMDO
*Camp Parks Communication Annex, CA
Cape Canaveral Air Force Station
Cape Canaveral ELS PCT Station
Diego Garcia, IO
Fairchild AFB, WA
Falcon AFB, CO
Guam Tracking Station
Hawaii Tracking Station, Oahu, HI
Indian Ocean Tracking Station, Seychelles, IO
Kennedy Space Center (Patrick AFB)
Kwajalein Ground Antenna/Monitor Station (GPS)
Kwajalein Atoll
Naval Satellite Ops Center (NAVSOC), Pt. Mugu
New Hampshire Tracking Station, NH
Oakhangar AFS, CA
Offutt AFB
Onizuka AFS, CA
Patrick AFB, FL
Phillips Lab/Edwards AFB
Phillips Lab/Kirtland AFB
Rome Laboratory
Seychelles, IO
Thule Tracking Station
U. S. Army Research Institute of Environmental
Medicine
Vandenburg AFB

Industry

Aerojet Electronics Systems Division
Aerospace Corporation
Boeing
COMSAT Corporation

Figure I - 7
Sites By Agency/Industry

Volume 1 - Facilities Inventory

<u>Agency:</u>	<u>Site</u>
Industry (cont'd)	Fairchild Space & Defense Systems General Dynamics Hercules Honeywell (Space and Aviation) Hughes IBM Federal Systems Lockheed (Space) Lockheed (Aero) Loral (Infrared and Imaging Systems) Martin Marietta (Astronautics Division) ¹ Motorola National Technical Systems Rockwell (Rocketdyne) Rockwell (Space) Rockwell (HQ Ops) Texas Instruments Thiokol TRW Space & Electronics Group United Technologies (Chemical Systems Div.) United Technologies (Pratt & Whitney) Westinghouse
NASA	Ames Research Center Dryden Flight Research Center Goddard Space Flight Center Wallops Flight Facility Jet Propulsion Laboratory Johnson Space Center/White Sands Downey/Palmdale Kennedy Space Center Langley Research Center Lewis Research Center/Plumbrook Station

Figure I - 7
Sites By Agency/Industry

¹ Data received in hard-copy form on 4/6/94, but not interpreted & loaded to NFS database as of printing.

Volume 1 - Facilities Inventory

<u>Agency:</u>	<u>Site</u>
NASA (cont'd)	Marshall Space Flight Center/Michoud Assembly Facility Stennis Space Center
NOAA	Fairbanks Command and Data Acquisition Station Suitland Federal Center Wallops Command and Data Acquisition Station
DoE	Ames National Lab Argonne National Lab Brookhaven National Lab Idaho National Engineering Lab Lawrence Livermore National Lab Nevada Operations Office Oak Ridge National Labs Pacific Northwest Labs Sandia/Los Alamos National Lab Stanford Linear Accelerator Center

Figure I - 7
Sites By Agency/Industry

Volume 1 - Facilities Inventory

**Figure I - 8
Types of Facilities at Selected Sites**

Aerojet Electronic Systems Division

Communications
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Manufacturing
Mission Operations
Processing
Support
Test Chambers
Testbeds
Tracking & Data Acquisition

Aerospace Corporation

Environmental Simulation/Experimentation
Operational Simulation/Demonstration
Processing
Propulsion Testing
Research Laboratory
Operational Simulation/Demonstration
Test Chambers
Test Stands
Testbeds

Ames Research Center

Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Human Factors/Biomedical
Manufacturing
Mission Operations
Operational Simulation/Demonstration
Operations
Payload Operations
Processing
Propulsion Testing
Range
Research Laboratory
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Training

Wind Tunnels

Antigua AS, West Indies Range

Armstrong Laboratory/Human System Center

Human Factors/Biomedical
Operational Simulation/Demonstration
Research Laboratory
Test Chambers

Arnold Engineering Development Center

Assembly
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Launch
Materials
Mission Operations
Operational Simulation/Demonstration
Operations
Propulsion Testing
Range
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Wind Tunnels

Ascension AAF, South Atlantic Range

BMDO

Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Mission Operations
On-Orbit Mission Control Centers
Operational Simulation/Demonstration
Operations
Payload Operations
Processing

Volume 1 - Facilities Inventory

Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Wind Tunnels

Boeing
Assembly
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Manufacturing
Payload Operations
Processing
Propulsion Testing
Research Laboratory
Test Chambers
Test Stands
Testbeds
Training
Wind Tunnels

Cape Canaveral Air Force Station
Launch
Launch Processing/Ordnance
Mission Operations
Payload Operations
Range

Cape Canaveral ELS PCT Station
Tracking & Data Acquisition

COMSAT Corporation
Assembly
Communications
Research Laboratory
Test Chambers

Diego Garcia, IO
Tracking & Data Acquisition

Dryden Flight Research Center/ARC
Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Landing Ops
Launch
Launch Processing Ops

Manufacturing
Mission Operations
Operational Simulation/Demonstration
Operations
Payload Operations
Processing
Range
Recovery Ops
Research Laboratory
Support
Test Chambers
Test Stands
Tracking & Data Acquisition

Fairbanks Command and Data Acquisition Station
Communications
Operations
Tracking & Data Acquisition

Fairchild AFB, CO
Communications
On-Orbit Mission Control Centers
Tracking & Data Acquisition

Falcon AFB, CO
Communications
Mission Operations
On-Orbit Mission Control Centers
Payload Operations
Testbeds
Tracking & Data Acquisition

Fairchild Space and Defense Corporation
Assembly
Communications
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Human Factors/Biomedical
Manufacturing
Materials
Operational Simulation/Demonstration
Operations
Payload Operations
Processing
Research Laboratory
Support

Volume 1 - Facilities Inventory

Test Chambers
Test Stands
Testbeds
Training

General Dynamics Corp. - Space Systems Division

Assembly
Environmental Simulation/Experimentation
Launch
Launch Processing Ops
Launch Processing/Booster
Manufacturing
Materials
Mission Operations
Operational Simulation/Demonstration
Operations
Payload Operations
Processing
Propulsion Testing
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds

Goddard Space Flight Center

Communications
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Mission Operations
On-Orbit Mission Control Centers
Operations
Test Chambers
Testbeds
Tracking & Data Acquisition

Guam Tracking Station

Tracking & Data Acquisition

Hawaii Tracking Station, Oahu, HI

Communications
Range
Tracking & Data Acquisition

Hercules Incorporated

Assembly

Manufacturing
Processing

Honeywell, Inc. - Space Systems Division

Assembly
Communications
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Launch Processing Ops
Manufacturing
Materials
Operational Simulation/Demonstration
Operations
Processing
Research Laboratory
Support
Test Chambers
Test Stands
Testbeds

Hughes

Test Chambers
Test Stands
Testbeds

Indian Ocean Station, Seychelles, IO

Communications
Support
Tracking & Data Acquisition

Jet Propulsion Lab

Assembly
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Manufacturing
Materials
Mission Operations
Operations
Processing
Range
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition

Johnson Space Center

Volume 1 - Facilities Inventory

Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Human Factors/Biomedical
Landing Ops
Launch
Manufacturing
Materials
Mission Operations
On-orbit mission Control Centers
Operational Simulation/Demonstration
Operations
Payload Operations
Processing
Propulsion Testing
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Training

Kennedy Space Center

Launch
Payload Operations
Range
Recovery Ops

Kennedy Space Center (PAFB/DOD)

Range

Kwajalein Ground Antenna/Monitor Station (GPS)

Communications
Tracking & Data Acquisition

Langley Research Center

Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Landing Ops

Manufacturing
Materials
Operational Simulation/Demonstration
Operations
Processing
Propulsion Testing
Research Laboratory
Support
Test Chambers
Test Stands
Testbeds
Wind Tunnels

Lewis Research Center

Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Manufacturing
Materials
Operational Simulation/Demonstration
Payload Operations
Propulsion Testing
Research Laboratory
Rocket Propulsion Ground Test Facility
Test Chambers
Test Stands
Testbeds
Wind Tunnels

Lockheed

Assembly
Communications
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Launch Processing Ops
Manufacturing
Materials
Mission Operations
Operational Simulation/Demonstration
Operations
Processing
Range
Research Laboratory
Support
Test Chambers

Volume 1 - Facilities Inventory

Test Stands
Testbeds
Tracking & Data Acquisition
Training
Wind Tunnels

Loral Infrared and Imaging Systems
Assembly
Manufacturing
Materials
Research Laboratory
Test Chambers

Marshall Space Flight Center
Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Human Factors/Biomedical
Launch Processing/Booster
Manufacturing
Materials
Mission Operations
On-orbit mission Control Centers
Operational Simulation/Demonstration
Operations
Payload Operations
Processing
Propulsion Testing
Range
Recovery ops
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Training
Wind Tunnels

Motorola, Inc.
Assembly
Environmental Simulation/Experimentation
Manufacturing
Research Laboratory

National Technical Systems
Assembly
Test Chambers
Testbeds
Wind Tunnels

New Hampshire Tracking Station, NH
Communications
Tracking & Data Acquisition

Oakhanger, Borden Hauts, UK
Communications
Tracking & Data Acquisition

Offutt AFB, NE
Communications
Mission Operations
On-orbit mission Control Centers
Payload Operations

Onizuka AFS, CA
Assembly
Communications
Data Archive/Storage
On-orbit mission Control Centers
Operational Simulation/Demonstration
Operations
Processing
Tracking & Data Acquisition

Patrick AFB, FL
Range

Phillips Lab/Edwards AFB
Assembly
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Materials
Processing
Propulsion Testing
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition

Rockwell

Volume 1 - Facilities Inventory

Assembly
Computational Support/Computer Ops
Environmental Simulation/Experimentation
Launch
Manufacturing
Materials
Mission Operations
Operational Simulation/Demonstration
Operations
Processing
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Wind Tunnels

Rome Laboratory
Communications
Processing
Range
Research Laboratory
Testbeds
Tracking & Data Acquisition

Stennis Space Center
Assembly
Communications
Computational Support/Computer Ops
Manufacturing
Materials
Operations
Processing
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Tracking & Data Acquisition
Wind Tunnels

Suitland Federal Center, Building #4
On-orbit mission Control Centers
Operations
Payload Operations
Processing
Tracking & Data Acquisition

Texas Instruments, Inc. - Defense Systems & Electronics
Computational Support/Computer Ops
Manufacturing
Research Laboratory
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Training

Thiokol
Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Manufacturing
Materials
Operational Simulation/Demonstration
Operations
Processing
Propulsion Testing
Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Wind Tunnels

Thule Tracking Station
Communications
Tracking & Data Acquisition

TRW Space and Electronics Group
Assembly
Communications
Computational Support/Computer Ops
Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Human Factors/Biomedical
Manufacturing
On-orbit mission Control Centers
Payload Operations
Processing
Propulsion Testing

Volume 1 - Facilities Inventory

Research Laboratory
Rocket Propulsion Ground Test Facility
Support
Test Chambers
Test Stands
Testbeds
Tracking & Data Acquisition
Wind Tunnels

United Technologies, Inc.
Manufacturing
Operational Simulation/Demonstration
Processing
Propulsion Testing
Rocket Propulsion Ground Test Facility
Test Stands

**US Army Research Institute of
Environmental Medicine**
Environmental Simulation/Experimentation
Research Laboratory
Test Chambers

Vandenberg AFB
Communications
Launch
Payload Operations
Range
Testbeds
Tracking & Data Acquisition

**Wallops Command and Data Acquisition
Station**
Communications
Mission Operations
Processing
Support
Tracking & Data Acquisition

Wallops Flight Facility/GSFC
Launch
Payload Operations
Range
Recovery Ops

Westinghouse Electric
Assembly
Computational Support/Computer Ops

Data Archive/Storage
Environmental Simulation/Experimentation
Flight Experiment Ground Support (clean room)
Manufacturing
Materials
Operations
Processing
Research Laboratory
Support
Test Chambers
Test Stands
Training

Volume 1 - Appendix 1
List of Participants

Gen. Billie McGarvey	Director, Facilities Engineering Division, NASA HQ - Co-chairman, Facilities Engineering & Costing Task Group
Col. Connie Brown	Office of the Secretary of Defense - Co-chairman, Facilities Engineering & Costing Task Group
Mr. Bill Brubaker	Deputy Director, Facilities Engineering Division, NASA HQ - member, Facilities Engineering & Costing Task Group
Mr. Bob Hammond	Chief, Facilities Operations and Maintenance Office, NASA HQ - member, Facilities Engineering & Costing Task Group
Mr. Scott Holliday	Facilities Operations and Maintenance Office, NASA HQ - Task Manager, Facilities Inventory Database Development
MSgt. Ed Fuller	Office of the Deputy Assistant Secretary of the Air Force for Space Plans and Policy - member, Space Operations Task Group
Col. Laura Kennedy	Office of the Deputy Assistant Secretary of the Air Force for Space Plans and Policy - member, Space Operations Task Group
LCol. Stan Mushaw	Office of the Deputy Assistant Secretary of the Air Force for Space Plans and Policy - member, Space Operations Task Group
Mr. Ralph Spillinger	Facilities Planning and Projects Office, NASA HQ - member, Space Operations Task Group
Ms. Judy Simonds	Chief, Program Evaluation Branch, Office of Space Flight, NASA HQ - member, Space Operations and Space Research and Development Task Groups

Special Recognition:

Mr. Bill Baracat	General Research Corporation - Project Manager, NFS Facilities Inventory Development
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